An Instrument to Measure Aircraft Sulfate Particle Emissions, Phase II

Completed Technology Project (2012 - 2014)

Project Introduction

Aerodyne is developing a sulfate detection instrument, based on the Tunable Infrared Laser Differential Absorption Spectrophotometer (TILDAS) technology and therefore termed the "TILDAS-sulfate" instrument, for measurement of the size-resolved sulfate PM emissions of aircraft engine combustion. Over the past 10 years and through a series of NASA led efforts, the Aerodyne Research Inc emissions team has made a series of contributions to on-going NASA programs to characterize aircraft engine emissions. Despite progress, significant knowledge gaps exist – especially for combustion emissions of alternatives to petroleum jet fuel. During this SBIR effort, we tested instrument performance in the absence of interferences, in the presence of >20-fold excess sulfur dioxide interference, in the presence of a combustion gases containing nitrogen oxide and hydrocarbons as potential interferences, and for particles ranging in size from 100 to 300 nm. Instrument sensitivity was shown to be at least 600 ng per meter cubed (on a 1-sec cycle). In Phase II, we plan to: upgrade the instrument and incorporate improvements to Aerodyne's TILDAS technology to improve the detection limit to as low as 60 ng per meter cubed – on a 1-sec data acquisition cycle; test the upgraded instrument in the laboratory; demonstrate the instrument in the field for characterization of aircraft engine particle emissions.

Primary U.S. Work Locations and Key Partners

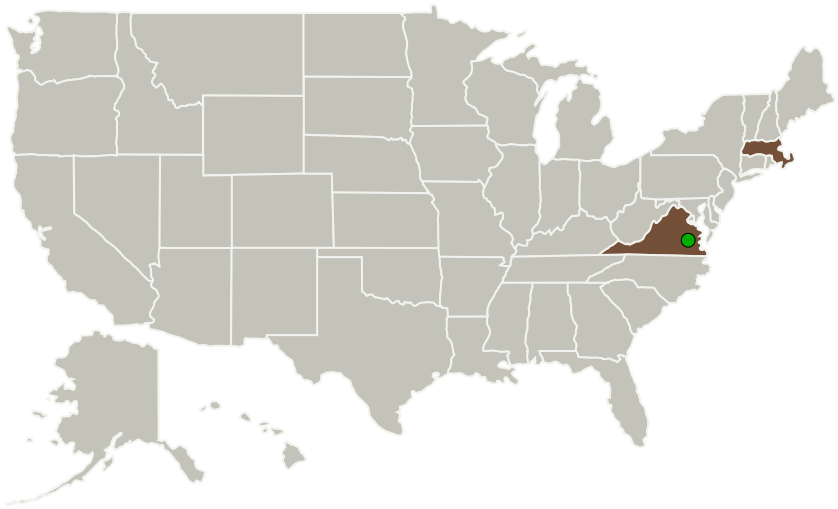

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Aerodyne Research, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Continued on following page.

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Organizations Performing Work	Role	Type	Location
Aerodyne Research, Inc	Lead Organization	Industry	Billerica, Massachusetts
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Massachusetts	Virginia

Project Transitions

April 2012: Project Start

October 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137382)*

Images

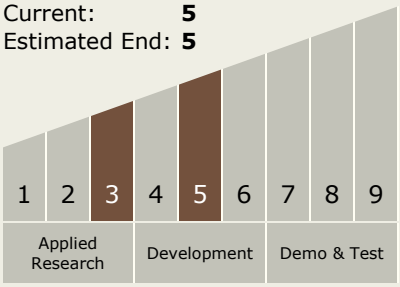
Project Image
An Instrument to Measure Aircraft Sulfate Particle Emissions
(https://techport.nasa.gov/image/134735)

Project Management *(cont.)*

Principal Investigator:
Jhongwoo Peck

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System